

What is claimed is:

1 A package for housing semiconductor chip comprising:
a substrate, whose upper face is provided with a mounting space whereon a semiconductor chip is mounted, and whose opposite sides are provided with a screw mounting part that is a through-hole or notch, and at least a portion of the substrate below the mounting space comprising

a metal-diamond composite comprising diamond grains,

a metal carbide covering a surface of the diamond grains, and

a metal containing silver and/or copper as a main component and laying between the diamond grains by infiltrating therebetween, and

wherein, a remaining part that includes the screw mounting part consists of a metal;

a frame on the upper face of the substrate so as to surround the mounting space, the frame having a joint for an input/output terminal at a side or top thereof; and

an input/output terminal being connected to the joint.

2 A package for housing semiconductor chip according to claim 1, wherein at least a portion of a surface of said substrate comprising the metal and the metal-diamond composite, and/or a portion of a surface of said frame, and/or a portion of a surface of said input/output terminal is plated with gold.

3 A package for housing semiconductor chip according to claim 1, wherein the metal of the substrate, which comprises comprising the metal and the metal-diamond composite is a metal or a metal alloy containing at least one element selected from Cu, Fe, Mo, W, Ni, Co and Cr.

4 A package for housing semiconductor chip according to

claim 1, wherein a thermal expansion coefficient of the metal of said substrate, which comprises the metal and the metal-diamond composite, is the same as or greater than a thermal expansion coefficient of the metal-diamond composite.

5 A package for housing semiconductor chip according to claim 1, wherein a method for joining said metal and said metal-diamond composite is brazing.

6 A package for housing semiconductor chip according to claim 1, wherein a method for joining said metal and said metal-diamond composite is a method involving diffusion of the metals.

7 A package for housing semiconductor chip according to claim 1, wherein a method for joining said metal and said metal-diamond composite is tight-fit bonding.

8 A package for housing semiconductor chip according to claim 1, wherein an average grain diameter of the diamond grains is 10 to 700 μm .

9 A package for housing semiconductor chip according to claim 8, wherein an average grain diameter of the diamond grains is 50 to 700 μm at a center of the metal-diamond composite and 10 to 60 μm at a circumference thereof.

10 A semiconductor device comprising:
the package for housing semiconductor chip according to claim 1;
a semiconductor chip being mounted on and fixed to the mounting space; and
a lid being joined to an upper face of the frame.

11 A method for fabricating a package for housing semiconductor chip comprising:

inserting a metal-diamond composite into part of a hole in a metal substrate provided with a hole, the metal-diamond composite comprising diamond grains whose surface is covered with a metal carbide and a metal containing silver and/or copper as a main component and the metal laying between the diamond grains by infiltrating therebetween; and

joining the metal substrate and the metal-diamond composite together to form a substrate;

providing a mounting space to mount a semiconductor chip on an upper face of the substrate;

providing a screw mounting part that is a through-hole or notch at opposite sides of the substrate; and

assembling the substrate, a frame to be on the upper face of the substrate so as to surround the mounting space and having a joint for an input/output terminal at a side or top thereof, and an input/output terminal to be connected to the joint.

12 A method for fabricating a package for housing semiconductor chip comprising:

filling diamond grains, a powder of a metal containing copper and/or silver as a main component and a powder of a metal used to form a carbide, into a hole in a metal substrate provided with a hole;

packing a mixture of the diamond grains and the metal powders so that the diamond grains and the metal powders are distributed at a uniform density;

heating the packed mixture so as to form a metal-composite in which a carbide covers a surface of the diamond grains, and to join the metal-diamond composite and the metal substrate together to form a substrate, by allowing the metal containing copper and/or silver as a main component to infiltrate a gap in the powders;

providing a mounting space to mount a semiconductor chip on an upper face of the substrate;

providing a screw mounting part that is a through-hole or notch at opposite sides of the substrate; and

assembling the substrate, a frame to be on the upper face of the substrate so as to surround the mounting space and having a joint for an input/output terminal at a side or top thereof, and an input/output terminal to be connected to the joint;

13 A method for fabricating a package for housing semiconductor chip comprising:

press-molding a diamond grains, a powder of a metal containing copper and/or silver as a main component and a powder of a metal used to form a carbide, so as to form a temporary molded body in which the diamond grains and the metal powders are distributed at a uniform density;

filling the temporary molded body into a hole in a metal substrate provided with a hole;

allowing the powder of a metal containing copper and/or silver as a main component to infiltrate the temporary molded body so as to form a metal-diamond composite in which a carbide covers a surface of the diamond grains, and to join the metal-diamond composite and the metal substrate together, for obtaining a substrate;

providing a mounting space to mount a semiconductor chip on an upper face of the substrate;

providing a screw mounting part that is a through-hole or notch at opposite sides of the substrate; and

assembling the substrate, a frame to be on the upper face of the substrate so as to surround the mounting space and having a joint for an input/output terminal at a side or top thereof, and an input/output terminal to be connected to the joint.

14 A method for fabricating a package for housing

semiconductor chip according to claim 13, wherein the temporary molded body is sandwiched between a molded bodies of the powder of a metal containing copper and/or silver as a main component, and then the metal containing copper and/or silver as a main component is allowed to infiltrate the temporary molded body by heating.